

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Patent Application of

Ieyasu KOBAYASHI et al. ✓

Serial No. 09/762,920 ✓

Filed: February 14, 2001 ✓

For: BIAXIALLY ORIENTED POLYESTER  
FILM AND MAGNETIC RECORDING  
MEDIUM

Group Art Unit: 1773 ✓

Examiner: S. Resan ✓



RESPONSE AND REQUEST FOR RECONSIDERATION

Commissioner of Patents  
Washington, DC 20231

Sir:

This is a full and timely response to the non-final Official Action mailed September 26, 2002. Reexamination and reconsideration in light of the above amendments and the following remarks are courteously requested.

No claims are amended, added, or canceled by way of this response. Thus, claims 1 to 11 as originally filed are currently pending for the Examiner's consideration.

In the Office Action, the Examiner rejected claims 1 to 3, 5 to 9, and 11 under 35 U.S.C. § 102(a) as being anticipated by, or under 35 U.S.C. § 103(a) as being unpatentable over JP 11-144227("Masafumi"). Claims 1 to 3, 5, and 7 to 9 are rejected under 35 U.S.C. § 102(b) as being anticipated by, or under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,665,454 ("Hosoi"). Finally, claims 1 to 2, 4 to

5, 7 to 8, and 10 under 35 U.S.C. § 102(b) as being anticipated by, or under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,364,684 ("Sakamoto"). These rejections are respectfully traversed for the following reasons, and in light of the attached Declaration submitted under 37 C.F.R. § 1.132 by Ieyasu Kobayashi who is the first named inventor of the present application.

**A. The Present Invention**

As set forth in claim 1, the biaxially oriented polyester film for magnetic recording media of the present invention includes:

(1) a dimensional change in a direction perpendicular to a load application direction on the film plane of 0.40% or less when the film is treated at 49 °C and 90% RH under a load of 2.7 kg per 1 mm<sup>2</sup> of unit sectional area in a thickness direction of the film for 72 hours,

(2) a crystallinity of 27 to 45%,

(3) a temperature expansion coefficient,  $\alpha_t$ , in a direction perpendicular to the above load application direction on the film plane of  $-5 \times 10^{-6}$  to  $+20 \times 10^{-6}/^{\circ}\text{C}$  and a humidity expansion coefficient,  $\alpha_H$ , in a direction perpendicular to the above load application direction on the film plane of  $+5 \times 10^{-6}$  to  $+20 \times 10^{-6}/\%RH$ , the value of ( $\alpha_t +$

2 $\alpha$ h) being  $+45 \times 10^{-6}$  or less,

(4) a heat shrinkage factor in a direction perpendicular to the above load application direction on the film plane of 0 to 0.7%, and

(5) a thickness of 3 to 7  $\mu\text{m}$ .

The biaxially oriented polyester film produces hardly any track dislocation error due to a dimensional change in the width of a tape, and can improve output characteristics as a base film for digital data storage magnetic recording media of a linear track system (see present specification, page 5, lines 1 to 7).

#### **B. Masafumi**

Masafumi discloses a biaxially oriented polyethylene-2,6-naphthalene dicarboxylate film for magnetic recording media (see claim 1). The biaxially oriented film is obtained by stretching an unstretched film to 4.0 to 6.0 times in a longitudinal direction at 120 to 150 °C and then 3.0 to 5.0 times in a transverse direction at 140 to 180 °C, optionally further stretching the film to 1.1 to 2.0 times in the longitudinal direction at 130 to 180 °C and to 1.1 to 2.0 times in the transverse direction at 130 to 180 °C again, and then heat setting the biaxially oriented film at 170 to 260 °C for 0.5 to 60 seconds (see paragraphs [0028], [0029]). When the

heat setting temperature is raised, the refractive index in a thickness direction of the film can be increased and the heat shrinkage in the crosswise direction of the film can be reduced (see paragraph [0020]).

In example 2, a biaxially oriented film having a thickness of 4.5  $\mu\text{m}$  was obtained by stretching an unstretched film of the polyethylene-2.6-naphthalate having an intrinsic viscosity of 0.63 dl/g and containing 0.02 wt% of monodisperse silica particles having an average particle diameter of 0.1  $\mu\text{m}$  to 5.2 times in a longitudinal direction at 120 °C and then to 4.3 times in a transverse direction, heat setting the biaxially oriented film at 220 °C for 15 seconds, and relaxing the film by 0.3% through a suspension heat treatment at 110 °C. the heat shrinkage factor in the longitudinal direction of the film after it was treated at 65 °C for 9 days was 0.004.

As disclosed in the patent, Masafumi fails to disclose the above requirements (1) to (4) for specifying the biaxially oriented film of the present invention. In example 1 of the present specification, the biaxially oriented film of the presently claimed invention was obtained as a biaxially oriented film having a thickness of 4.5  $\mu\text{m}$  by preheating an unstretched film of polyethylene-2.6-naphthalene dicarboxylate which contained 0.02 wt% of calcium carbonate particles having an average particle diameter of 0.6  $\mu\text{m}$  and 0.2 wt% of silica

particles having an average particle diameter of 0.1  $\mu\text{m}$  at 75 °C, stretching it to 5.1 times in a longitudinal direction by heating 14 mm from above with an infrared heater having a surface temperature of 830 °C and then to 4.8 times in a transverse direction at 125 °C, heat setting the biaxially oriented film at 240 °C for 10 seconds and relaxing it by 1.0% in the transverse direction at 120 °C.

When the production conditions of the above example 1 of the present application are compared with the production conditions of the above example 2 of Masafumi, it is clear that there are distinct differences that preclude Masafumi from anticipating the present claims. The present inventor provides a Declaration under 37 C.F.R. § 1.132 which discloses experiments that were conducted on the product of example 2 of Masafumi. Values representing the physical properties (1) to (4) of claim 1 were measured for the product of example 2 of Masafumi, and the results are shown in Run 2 of the table in the Declaration. As shown in the table, it is clear that the film of example 2 of Masafumi fails to anticipate the properties (1) to (4) of claim 1 of the present application.

### C. Hosoi

Hosoi discloses a biaxially oriented, unidirectionally long polyethylene-2,6-naphthalate film:

(A) having a Young's modulus of at least 550 kg/mm<sup>2</sup> in the longitudinal direction and a Young's modulus of at least 600 kg/mm<sup>2</sup> in the transverse direction, the Young's modulus in the transverse direction being greater than the Young's modulus in the longitudinal direction,

(B) having a heat shrinkage, after heat treatment at 70 °C for 1 hour under no load, of 0.1% or less, and

(C) having a surface roughness, Ra, of 12 nm or less (see col. 3, lines 1 to 11).

The above biaxially oriented film is produced by stretching a polyethylene-2.6-naphthalate unstretched film of 2.5 to 7.0 times in one direction at (T<sub>g</sub> - 10) °C to (T<sub>g</sub> + 70) °C and to 2.5 to 7.0 times in a direction perpendicular to the above direction at (T<sub>g</sub>) °C to (T<sub>g</sub> + 70) °C, and heat setting the biaxially oriented film at 190 to 250 °C (see column 10, lines 22 to 45).

In example 1, a 10 μm-thick biaxially oriented film was obtained by stretching a 330 μm-thick unstretched film to 5.0 times in a longitudinal direction at 130 °C and then to 5.0 times in a transverse direction at 135 °C, further stretching the film to 1.3 times in the transverse direction again while heat setting the biaxially oriented film at 200 °C.

From the above discussion of Hosoi, it is clear that Hosoi fails to teach or suggest the requirements (1) to (4) of claim

1 of the present invention. Further, the biaxially oriented film of the present invention and the biaxially oriented film of Hosoi are produced by such different methods that requirement (5) is also not met by Hosoi. In examples 1 to 8 of Hosoi, biaxially oriented films having a thickness of 10  $\mu\text{m}$  (examples 1 to 4) and 8.3  $\mu\text{m}$  (examples 5 to 8) were obtained.

Therefore, these films clearly do not satisfy requirement (5) of the claims of the present invention. In view of the above, it is clear that the biaxially oriented film of the present invention, which produces hardly any track dislocation error due to a dimensional change in the width of a tape, is not anticipated or rendered obvious by Hosoi.

### C. Sakamoto

Sakamoto discloses a biaxially oriented polyethylene-2,6-naphthalate multilayered film which is extruded, stretched in a machine in transverse directions, and heat-treated at a temperature of 160 °C to 240 °C (see col. 1, line 58 to col. 2, line 3).

In example 1, a 5.0  $\mu\text{m}$ -thick PEN multilayered film was obtained by stretching a 130  $\mu\text{m}$ -thick laminated film (amorphous sheet) comprising PEN (A) containing 0.4 wt% of silicon oxide having an average particle diameter of 0.02  $\mu\text{m}$  and PEN (B) containing 0.05 wt% of the above silicon oxide to

5.4 times in a machine direction at 135 °C and to 5.0 times in a transverse direction at 137 °C and heat treating the biaxially oriented film at 230 °C.

As described above, the production conditions of example 1 of Sakamoto are very different from the production conditions of the present invention. The Declaration filed herewith shows experiments performed on the product of example 1 of Sakamoto and the measured values for that product regarding properties (1) to (4) of claim 1 of the present application. These results are shown in Run 3 of the table in the Declaration. From reviewing these data, it is clear that Sakamoto, like the other prior art, also fails to teach or suggest the properties that are claimed in the present claims, and consequently produces products that have track dislocation problems due to changes in tape width. Consequently, it is respectfully requested that the rejections under 35 U.S.C. §§ 102, 103 be withdrawn.

#### **Conclusion**


For the foregoing reasons, all the claims now pending in the present application are believed to be clearly patentable over the prior art of record. Accordingly, favorable reconsideration of the claims in light of the above remarks is courteously solicited. If the Examiner has any comments or suggestions that could place this application in even better



form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

Respectfully submitted,

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